

Notice of Allowability

Application No.

10/021,972

Examiner

John B Strege

Applicant(s)

MUELLER ET AL.

Art Unit

2625

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the application filed 12/14/01.
2. ☒ The allowed claim(s) is/are 1-42.
3. ☒ The drawings filed on 14 December 2001 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date 2/20/02, 8/25/03, 7/19/04
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____.
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

Allowable Subject Matter

1. Claims 1-42 are allowed.
2. The following is a statement of reasons for the indication of allowable subject matter: Regarding claim 1 none of the prior art discloses a method for confirming defects comprising analyzing the corresponding view to determine the slope of the surface of the printed circuit board across the view, and adjusting the distance between the printed circuit board and a sensor in response to the slope of the view. The closest prior art is Fujii et al. USPN 5,594,768 (hereinafter Fujii) that discloses taking tomographic images of solder marks in which the focal plane is set individually for each inspection area to prepare tomographic images. However Fujii does not disclose determining the slope of the view and adjusting the distance between the printed circuit board and sensor in response to the slope of the view. Roder USPN 6,314,201 discloses the inspection of circuit boards using a laminography system. Roder does not disclose associating an electrical connection with a corresponding view when a characteristic associated with the connection in an observed image indicates that the connection is defective, analyzing the corresponding view to determining the slope of the surface of the board across the view, and adjusting the distance between the board and a sensor in response to the slope of the view. Seng USPN 6,084,663 also fails to disclose the step of determining the slope of the view and adjusting the focal distance accordingly. Therefore claim 1 is allowable over the prior art. Claims 2-17 are dependent on claim 1 and thus are allowable for the same reason.

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Regarding claim 18, none of the prior art discloses an improved circuit board inspection system comprising means for segmenting a surface of a circuit board in response to an indication that an electrical connection on the circuit board is defective in combination with means for observing a characteristic of each defective electrical connection that accounts for variation in height of the surface of the circuit board over the corresponding segment. Again Fujii is the closest prior art. As discussed, Fujii accounts for variation in height of the surface of the circuit board. The field of view used for image capture is relatively small in comparison with the printed circuit board, thus Fujii examines the board in segments, however this is not done in response to an indication that an electrical connection on the circuit board is defective as claimed in the instant application. Thus claim 18 is allowable over the prior art. Claims 19-31 are dependent on claim 18, thus are allowable for the same reasons as claim 18.

Claim 32 discloses similar limitations to claim 18, and thus is allowable for the same reasons stated above. Claims 33-42 are dependent on claim 32 and thus are allowable for the same reasons.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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USPN .6,581,023 Accurate contact critical dimension using variable threshold images .

USPN 5,903,353 Method and apparatus for inspecting component placement and solder connection in printed circuit board manufacture.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John B Strege whose telephone number is (703) 305-8679. The examiner can normally be reached on Monday-Friday between the hours of 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (703) 308-5246. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JS



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